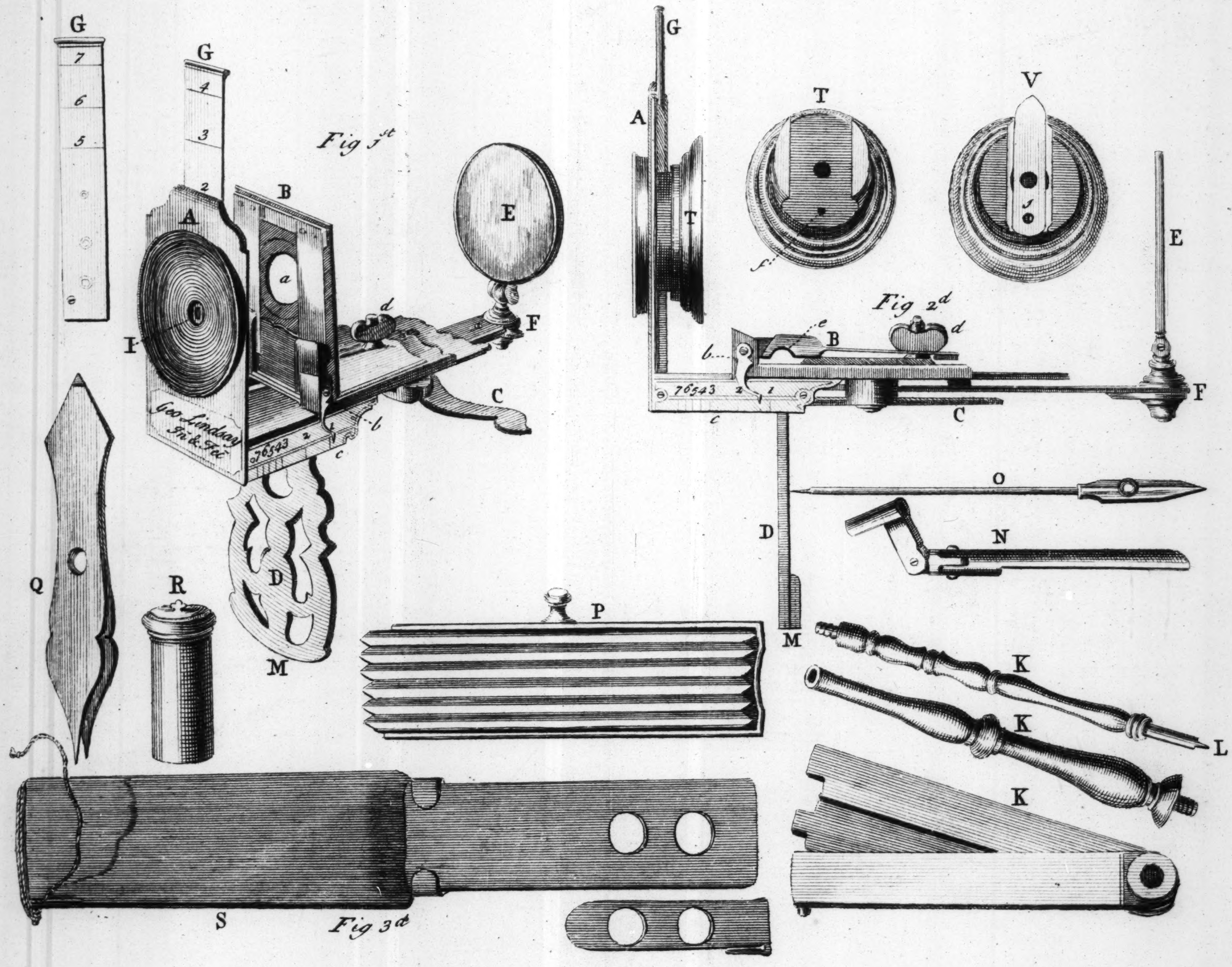
GEORGE *the Second, by the Grace of God, of* Great-Britain, France, *and* Ireland, *King, Defender of the Faith,* &c. *To all to whom theſe Preſents ſhall come, Greeting.* Whereas our Truſty and Well-beloved *George Lindſay*, of the Pariſh of St. *Martin's in the Fields*, in our County of *Middleſex*, has by his Petition humbly repreſented unto us, That he having for many Years ſtudied Mathematics, and having expended much Money, as well as Time and Thought, on Experiments, has at length invented, found out, and contrived a general portable *Microſcope*, of a Structure entirely new, and different from any now in Uſe, or that have yet been made, which with Parts for tranſparent and opake Bodies, Conveniencies for living Creatures, and a Stand, and reflecting *Speculum* are contained in a Caſe not exceeding ſix Cubic Inches, and is ſo contrived as the Inſtant it is taken out to be ready for Uſe, without the Trouble of ſcrewing or unſcrewing any Part, and meaſures by a Scale the focal Diſtance of each Lens, thereby giving the real and apparent Magnitudes of Objects, having alſo reflecting Mirrors for illluminating dark Bodies, and is applicable to all the Purpoſes which the Nature of *Microſcopes* admits; That the Progreſs of Enquiry into the minute Parts of Nature, juſtly eſteem'd by the Curious, having been greatly retarded by the inconvenient Apparatus made for that Purpoſe, in all former *Microſcopes*, are by this Invention entirely taken away, and that Inſtrument render'd eaſy and agreeable. The Petitioner, therefore, moſt humbly prays Us to grant him our Royal Letters Patent for the ſole Uſe and Benefit of his ſaid Invention, for the Term of Fourteen Years; We being willing to give Encouragement to all Arts and Inventions which may be for the public Good and Benefit, are graciouſly pleaſed to gratify the Petitioner in his Requeſt. KNOW YE, therefore, That We of our eſpecial Grace, certain Knowledge, and meer Motion, have given and granted, and by theſe Preſents, for Us, our Heirs and Succeſſors, do give, and grant unto the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, our eſpecial Licence, full Power, ſole Privilege and Authority, that he, the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, and every of them, by himſelf and themſelves, or by his and their Deputy or Deputies, Servants or Agents, or ſuch others as he the ſaid *George Lindſay*, his Executors, Adminiſtrators or Aſſigns, ſhall at any Time agree with, and no other, from Time to Time, and at all Times hereafter, during the Terms of Years herein expreſſed, ſhall and may lawfully make, uſe, exerciſe, and vend his ſaid Invention, within that Part of our Kingdom of *Great Britain*, called *England*, our Dominion of *Wales*, and Town of *Berwick* upon *Tweed*, in ſuch

Manner as to him, the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, or any of them, ſhall in their Diſcretions ſeem meet: And that he, the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, ſhall and lawfully may have, and enjoy the whole Profit, Benefit, Commodity and Advantage from Time to Time, coming, growing, accruing, and ariſing by reaſon of the ſaid Invention, for and during the Term of Years herein mentioned, to have, hold, exerciſe and enjoy the ſaid Licence, Powers, Privileges and Advantages herein before granted, or mentioned to be granted unto the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, for and during, and unto the full End and Term of Fourteen Years from the Date of theſe Preſents, next, and immediately enſuing, and fully to be compleat and ended according to the Statute in ſuch Caſe made and provided: And to the End, that the ſaid *George Lindſay*, his Executors, Adminiſtrators, and Aſſigns, and every of them, may have and enjoy the full Benefit, and the ſole Uſe and Exerciſe of the ſaid Invention herein before declared, We do, by theſe Preſents, for Us, our Heirs and Succeſſors, require and ſtrictly command all and every Perſon and Perſons, Bodies Politic and Corporate, and all other our Subjects whatever, of what Eſtate, Quality, Degree, Name, or Condition ſoever they be, within that Part of our Kingdom of *Great Britain* called *England*, our Dominion of *Wales*, and Town of *Berwick* upon *Tweed* aforeſaid, that neither they, nor any of them, at any Time, during the Continuance of the ſaid Term of Fourteen Years, hereby granted, either directly or indirectly, do make, uſe, or put in Practice the ſaid Invention, or any Part of the ſame ſo attained unto by the ſaid *George Lindſay* as aforeſaid, nor in anywiſe counterfeit, imitate, or reſemble the ſame, nor ſhall make, or cauſe to be made any Addition thereto, or Subſtraction from the ſame, whereby to pretend himſelf, or themſelves, the Inventor or Inventors, Deviſor or Deviſors thereof, without the Licence, Conſent, or Agreement of the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, in Writing under his or their Hands and Seals, firſt had and obtained in that Behalf upon ſuch Pains or Penalties as can or may be juſtly inflicted on ſuch Offenders for their Contempt of this our Royal Command, and further to be anſwerable to the ſaid *George Lindſay*, his Executors, Adminiſtrators or Aſſigns, according to Law, for his and their Damages thereby occaſioned. And, moreover, We do by theſe Preſents for Us, our Heirs and Succeſſors, will and command all and ſingular the Juſtices of the Peace, Mayors, Sheriffs, Bailiffs, Conſtables, Headboroughs, and all other Officers and Miniſters whatſoever, of Us, our

Heirs and Succeſſors for the Time being, that they, or any of them, do not, nor ſhall at any Time hereafter, during the ſaid Term hereby granted, in anywiſe moleſt, trouble, or hinder the ſaid *George Lindſay*, his Executors, Adminiſtrators or Aſſigns, or any of them, or his or their Deputies, Servants or Agents, in and about the due and lawful Uſe, or Exerciſe of the aforeſaid Invention, or any thing relating thereto. And laſtly, We do by theſe Preſents, for Us, our Heirs and Succeſſors, grant unto the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, that theſe our Letters Patent, or the Inrolment or Exemplification thereof, ſhall be in and by all Things good, firm, valid, and effectual in the Law, according to the true Intent and Meaning thereof, and ſhall be taken, conſtrued, and adjudged in the moſt favourable and beneficial Senſe for the beſt Advantage of the ſaid *George Lindſay*, his Executors, Adminiſtrators and Aſſigns, as well in all our Courts of Record as elſewhere, and by all and ſingular the Officers and Miniſters whatſoever of Us, our Heirs and Succeſſors, in that Part of our ſaid Kingdom of *Great Britain*, called *England*, our Dominion of *Wales*, and Town of *Berwick* upon *Tweed* aforeſaid, and amongſt all and every the Subjects of Us, our Heirs and Succeſſors whatſoever and whereſoever, notwithſtanding the not full and certain deſcribing the Nature or Quality of the ſaid Invention, or of the Materials thereto conducing or belonging. In Witneſs whereof, We have cauſed theſe our Letters to be made Patent. Witneſs Ourſelf at *Weſtminſter* the Seventeenth Day of *February*, in the Sixteenth Year of our Reign.

Any Gentleman may be further informed concerning this Inſtrument, by *G. Lindſay* Watchmaker, at the *Dial*, facing the *Fountain Tavern* in the *Strand, London*.



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BRITISH MUSEUM

An Explanation of the Mechaniſm and Uſes of a general portable MICROSCOPE, firſt invented and made in the Year 1728; and Publiſh'd by His Majeſty's Royal Letters Patent, *February* 17, 1742.

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By GEORGE LINDSAY, Watchmaker, in the *Strand*, *London*.

IF it be allowed, that he who both invents and executes all the Parts of any Machine, is a proper Perſon to explain its Mechaniſm and Uſes, I ſhall not need an Apology for publiſhing the Matter in the following Pages. The Manner in which they are wrote, I muſt ſubmit to Cenſure, which I flatter myſelf will be favourable from thoſe worthy Perſons, whoſe Approbation of the Inſtrument was the immediate Means of making it known to the World, and for whoſe Uſe this Explanation is principally intended: And I hope it will be accepted by them, as it is deſign'd by me to expreſs my grateful Senſe of their Favour, and to render the Uſe of the Inſtrument familiar. The Structure of it being new and different from any now in Uſe, or that have yet been made, renders an Explanation of it neceſſary; and as it may be expected I ſhall give ſome Reaſons for making ſo great an Alteration. Firſt, It was done many Years ago, and intended only to pleaſe myſelf; and tho' I foreſaw many Difficulties, and found many more in executing it on the Plan I had laid down, yet the Convenience and Eaſe of uſing it has ſince given me great Satisfaction. The particular Advantages I propoſed, were to bring the Magnifiers as cloſe as poſſible to the Eye, to enlarge the Angle of Viſion, and to make the Glaſſes as well as the Objects capable of being ſhifted immediately, by entirely removing the Trouble of ſcrewing and unſcrewing, which commonly employs much more Time than viewing the Objects. The Structure of it I propoſed to be large enough for all the Purpoſes requir'd, yet reduc'd ſo as to be conveniently portable, that it might be eaſily uſed when in a Field or Garden, where all Nature furniſhes innumerable Wonders that expreſs their Almighty Author, and demand our Attention. The Inconvenience of looking againſt the Light, I found very great, and all who have look'd through any Microſcope, muſt know is very troubleſome: This I reſolved to remove, and to view all kinds of Objects in any Situation, by Light reflected from a *Speculum*. Theſe ſeveral Improvements I could not obtain without altering the whole Fabrick of the Microſcope, and forming it on

Principles different from any I had ſeen or heard of. Whether theſe Ends were deſirable, or I have anſwer'd them to any Purpoſe in the Microſcope hereafter deſcribed, is now ſubmitted to the Judgment of all.

Fig. 1. repreſents the Inſtrument in a perſpective View ready for Uſe. A, I call the Head of the Inſtrument, which has a Cup to receive the Eye; to this Head is firmly fix'd a Plate, on which the Object Part B is mov'd backwards or forwards by the Leaver C, which turns out and folds in with the reſt. D is the Handle to turn up or down occaſionally. E is a Plane *Speculum* or Looking-glaſs, with a ſplit Shank that fits into a Socket at the End of the ſliding Bar F. G G are Sliders, in which the Glaſſes are ſet between the Plates confin'd with two ſmall Screws; each of theſe Sliders has a little Spring to make it move in the Groove with a moderate Stiffneſs, that any Glaſs you would uſe, may ſtay before the Aperture I. K K K are three Pieces, which form a Stand for the Micoſcope, by fixing them together, turning out the Foot to a Triangle, and putting the End L (which is likewiſe a Turn-ſcrew) into the Socket at the End of the Handle at M. N is a jointed Bar, with a Spring-Tube fitted to receive the Needle O, which has a Point at one End, and a ſmall Tongs at the other, to hold or ſtick any minute Objects. P is a Caſe containing 6 Sliders for Objects, one of which has round Plates with Holes between the Talks, and is intended to keep any minute living Creature, as a Mite, Flea, &c. Q is a Pair of Plyers to take up any ſmall Bodies, and the other End is for taking out the Rings that confine the Talks in the Ivory Sliders. R is a Box with Talks or Iſing-Glaſs, and Rings, to ſupply any that may be dropp'd or loſt. S is a Plate having ſome Line wound on one End to tie a Fiſh, Frog, &c. on, to view the Circulation of the Blood. The Letters A B C D E F G in *Fig.* 2. which is a Profile of the Inſtrument, refer to the Parts mark'd with the ſame Letters in *Fig.* 1, as deſcrib'd above.

Of Viewing Objects.

I Think it beſt to view any Object firſt with a ſmall Magnifier, as 2, and enlarge it afterwards by ſhifting to 3, 4, &c. for thus you obtain an Idea of the Object, and know what Part of it you ſee when magnified to a very great Degree, which otherwiſe might ſurprize, but would not inform the Obſerver. Tranſparent Objects are generally confin'd between two Talks in Ivory Sliders, ſuch as are in the Caſe P. One of theſe being put into the Object Part B, the round Hole in the Braſs Plate *a*, is a Guide to place the Object you would view before the Aperture I. Then having obſerved the Number of the Glaſs that is before the Aperture, and appears at the Top of the Head A, if you move the Object Part by the Leaver C, till the Index *b* comes on the Line under the ſame Figure on the Scale *c*, which is on the Side of the Inſtrument, the Object will then be in a Point of Viſion, and by the minuteſt Touch at either End of the Leaver C, the Object will be adjuſted immediately to the Eye of any Perſon that is viewing it. If you think proper to make the Object bigger, put down the Braſs Slider G, till the next Figure comes even with the Top of the Inſtrument, and move the Object Part nearer, till the Index is at the next Diviſion on the Scale under that Figure, and ſo on. By this Means you may view an Object with all the Magnifiers ſucceſſively in a very ſmall Space of Time, without ſcrewing or unſcrewing any Part.

Of Animalculæ *contained in Fluids, as Pepper, Water,* &c. *and the Blood or other Fluids contained in the Veſſels and Bodies of Animals, as Frogs, Fiſh,* &c.

FOR ſuch Fluids as contain *Animalculæ*, there is a Slider in the Caſe P made black, to be readily diſtinguiſhed, without taking out the reſt; this has ſingle Glaſſes in it, and by dipping the Head of a Pin, and touching the Glaſs, then placing it in the Inſtrument as before directed, the 3d or 4th Magnifier will diſcover great

Numbers of living Creatures in a Drop no bigger than a Grain of Sand.

For ſuch Fluids as are contained in the Veſſels of Animals, there is a Plate S, having on the End ſome ſmall Line. This Plate is to be join'd as repreſented in *Fig.* 3. to another which draws out of the Slider-Caſe P. The Body of the Fiſh, Frog, *&c.* is to be laid on the Plate S, and gently tied down, the Tail or Foot being extended over one of the Holes in the other, and may be confined from moving, by a little Plate with two Holes in it, repreſented underneath, that puts on at the End. The Creature thus fixed, put the Plate with the Holes into its Place in the Slider-Caſe, and open the Object Part, by looſening the little Nut *d*, then bring the Place you would view before the Aperture, and holding the Object Part together, fix it faſt by tightening the Nut *d*, examine it with the 4th or 5th Magnifier, and you will ſee the Blood Globules rolling through the Veins and Arteries with a prodigious Rapidity. The finny Parts of the Tail in Fiſh, and the Skin between the Toes of the hinder Feet in Frogs, are thoſe uſually looked at; but there are ſome tranſparent Creatures, in which it may be ſeen in the Bodies, as likewiſe the Pulſation of the Heart, and periſtaltic Motion of the Inteſtines, *&c.*

The Object Part will in the ſame Manner receive Glaſs Tubes of different Sizes for thoſe that chuſe them, but I have found this Method more eaſy and expeditious. I here beg Leave to obſerve, that the Structure of this Inſtrument admits of a great Variety of Means for confining and applying Objects of different Kinds, which is perhaps as conſiderable an Advantage as a Microſcope can poſſibly have.

Of viewing opake Bodies. Theſe, if they are whole Inſects, may be taken in the Tongs O, and the Inſtrument is immediately made fit to receive them, by drawing of the Braſs Plate of the Object Part, and turning down the other, which being confin'd by placing the little Nut *d*, as repreſented in *Fig.* 2. There will be a Cavity at *e* fitted to receive the Tail of the jointed Bar N, in the Spring Tube of which you are to put the Needle O, and preſent your Object before the Aperture. If it be pretty large, the firſt Magnifier is proper. This is ſet in one of the Silver Mirrors V, and goes into the Groove as the Sliders GG. The Mirror will reflect either the Day or Candle-light on that Side of the Object next the Eye, and the Superficies will appear very diſtinctly. If you find it neceſſary to magnify more, you muſt uſe the other Mirror T, which has a Mark on it at *f*, to ſhew the Way it is fitted to go on the Outſide of the Groove beforementioned, the Mark is to go downwards, this Mirror is repreſented, ſo put on in *Fig.* 2. and one of the Sliders G, with the 2d, 3d, and 4th Glaſſes are to be uſed with it. The Figure of it returns the Light in a radiant Line, from its Center to an Inch Diſtance; and therefore an Object placed in any Part of that Line, will be ſufficiently illuminated; and if it be ſmall, you may uſe the 5th or 6th Glaſs with this Mirror, and have Light enough.

The *Speculum* E being us'd with theſe Mirrors, you need not preſent your Face to the Light; for either the Day or Candle-light may be reflected by that to the Mirrors, and from them be returned to the Object, and it will be found, that looking directly againſt the Sky or a Candle, for a ſmall Time, will tire the Eye more than an Hour's conſtant viewing of Objects in this Manner.

I have in Plate the 2d, *Figure* 1, given a Plan of the Caſe which contains this Inſtrument; it is cover'd with Shagreen, and has Partitions in it, as repreſented in the Figure; the Inſtrument repreſented in *Fig.* 1, and 2d in Plate the 1ſt, being ſhut together and the Handle turn'd down, goes into the Diviſion of the Caſe mark'd 1, the reflecting *Speculum* mark'd E goes into that mark'd with the ſame Letter, and ſo of all the reſt: In the Cover of the Caſe there is a Flap turns up, which has Places fitted to receive the two Sliders, with the Magnifiers G G. The Figure being ſo plain, and the Letters referring to the ſeveral Parts mark'd with the ſame Letters in Plate 1, makes any farther Directions unneceſſary.

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Fig. 1. *plate 2.*

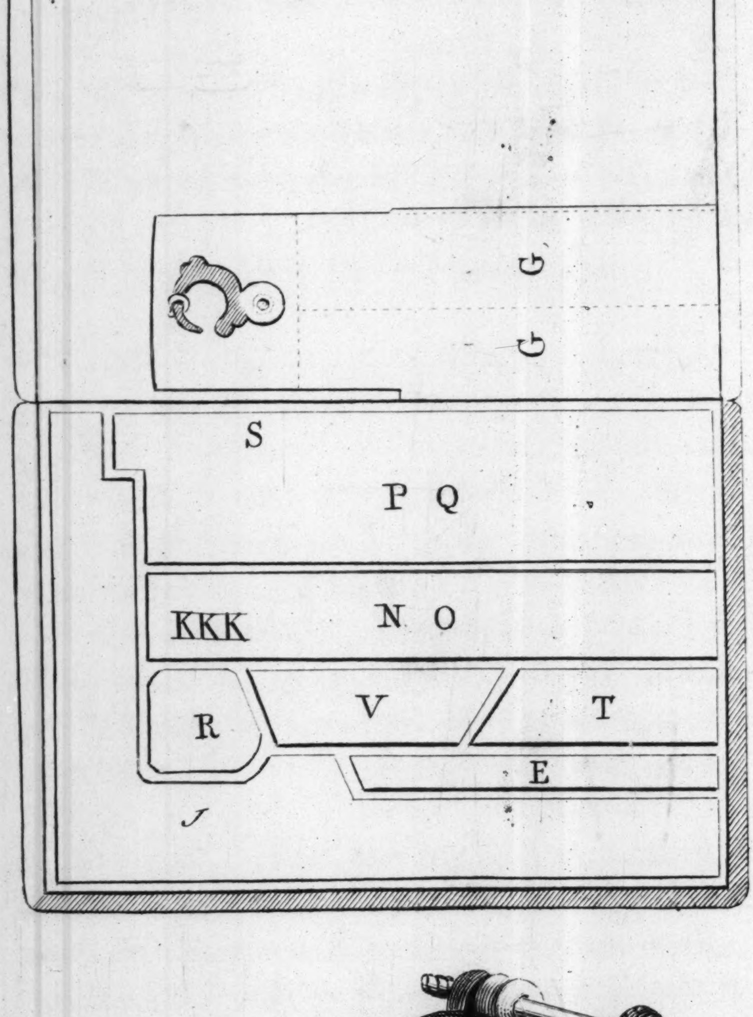
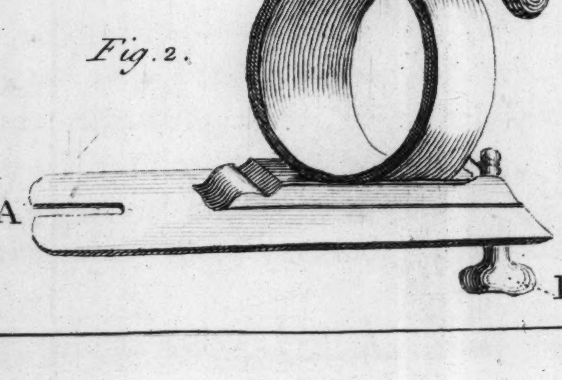


Fig. 2.



Of applying the Microſcope *to the Sun in a darkened Chamber.*

THis Method of applying the *Microſcope*, has been found highly entertaining, as a Company may ſit and view the Objects before them like a Picture, and likewiſe that you may by this Means magnify an Object to what Degree you pleaſe.

The Uſe of it depends on the Sunſhine, and there is an *Apparatus* which is commonly made to fix to the Window-ſhutter, conſiſting of a Tube, a Convex Lens and a Looking-Glaſs; at the End of the Tube there is a ſmall Tube to fix on the common Pocket *Microſcope*, and the Inſtrument deſcrib'd in this Account is capable of being apply'd and fix'd to this Tube, and us'd with leſs Trouble. *Fig.* 2, in Plate 2, is a Piece to fix to my Inſtrument, in order to ſlip it on to this Tube; it conſiſts of a Hoop of Braſs, with a Screw to make it embrace the Tube; this Hoop is faſten'd on a Plate, in which is a Slit or Notch at A, the Nut of the Inſtrument *d* is to be looſen'd till the Plate will go underneath it; then put the Screw B through the Socket F, at the End of the ſliding Bar repreſented in Plate 1, *Fig.* 1. and fix it faſt, the Inſtrument is then ready to ſlip on to the *Apparatus* abovemention'd, and by drawing the Head of the Inſtrument backwards or forwards you may adjuſt it immediately ly to any of the Magnifiers, and receive the Image of the Object on a Paper-Screen or Sheet placed at a proper Diſtance. The propereſt Glaſſes to be uſed for this Purpoſe are the 2d and 3d, which will be found ſufficient for any Objects viewed this way, with the Screen at about three Foot Diſtance. But as I am ſatisfied this Way of viewing Objects may be much improved, and the *Apparatus* reduc'd to a greater Simplicity, I ſhall ſay no more of it.

I have here added a ſhort Abſtract of Objects proper for this Inſtrument, collected from the beſt Accounts, and my own Obſervations, for the Uſe of thoſe who may not have read the Works in which theſe Matters are more particularly treated of.

All Sorts of ſtagnated Waters, eſpecially in the warm Months, abound with *Animalculæ* of different Forms and Magnitudes, and are in general moſt entertaining and wonderful Objects.

Particular Infuſions made by putting into a Glaſs of Water any of the following Subſtances, and ſuffering them to ſtand two or three Days uncover'd, will produce different Kinds, as each becomes a proper Nidus for the Eggs of different Animals. Pepper, Hay, Leather, Bread, Oranges and other Fruits, Senna and moſt Drugs, Flowers as Jeſſamin, Pinks, Roſes, Marygolds, &c. Among theſe Mr. *Joblot* gives a Draught of an Animal produc'd in Water, wherein the Flower *Anemony Royal* had been infus'd, that repreſented an exact Satyr's Maſque on their Backs.

Paſte made with Flour and Water boiled to a moderate Conſiſtence, being kept from growing mouldy on the Top by frequently ſtirring it, will, in a few Days, eſpecially in Summer-time, become ſour, and ſoon after will be cover'd with ſmall Animals like Eels, or Snakes; then if you take up a little Particle of it with the Nib of a clean Pen, and place it on a Glaſs, diluting it with a ſmall Drop of Water for them to ſwim in, the 2d Magnifier will ſhew them very diſtinctly.

All ſorts of minute Inſects, as Mites, Bookworms, Flies, *&c.* afford in all their Parts curious and entertaining Diſcoveries.

The Hairs of different Caterpillars, and alſo the Down or Colour on Moths and Butterflies are as various as the Creatures they are taken from, and ſome of them ſurprizing in their Form and Texture.

The Scales of the various Kinds of Fiſh are extremely beautiful, and the tranſparent Parts of the Fins and Tail, afford that wonderful Phenomenon, the Circulation of the Blood.

The Duſt or *Farina* of Flowers, their Seeds, Tufts, *&c.* are extraordinary beautiful Objects.

The Leaves of Plants, Flowers, *&c*, are frequently inhabited by living Creatures, and by viewing them on the Leaf, many of their Actions will be diſcover'd to great Advantage.

It has been ſaid that the Colour on Fruits, as Plumbs, Grapes, &c. are an Aſſemblage of ſmall *Animalculæ*, but I could never ſatisfy myſelf fully of it, therefore recommend it to the Tryal of the Curious.

All Kinds of Salts, Sands, and Duſt, Shells, and Minerals, the Mouldineſs on Liquors, Casks, Walls, &c. are each of them wonderful Objects.

The great Number of Moſſes of different Kinds, afford in their Leaves, Seeds, Bloſſoms, &c. an agreeable Variety of Entertainment.

All Nature abounds with Miracles, and it would be an endleſs Task to enumerate them, therefore there will always be new Matter of Diſcovery for the *Microſcope:* And were it poſſible to improve our Power of ſeeing by much greater Magnifiers than have yet, or can poſſibly be made, the Diſcoveries would ſtill be proportionable, and we ſhould only be more ſenſible, that to know the Power of the Almighty to Perfection, muſt be the Employment of Eternity.

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